



Physics for Modern Technology Quality Assurance Plan

Date submitted to SSCPR: September 22, 2023

Date Self-Study Report approved by SSCPR: June 22nd, 2022

Date of External Review: November 31st & December 1st, 2022

SUMMARY OF PROGRAM STENGTHS, CHALLENGES AND OPPORTUNITIES FOR IMPROVEMENT

The BSc in Physics for Modern Technology (PMT) at Kwantlen Polytechnic University (KPU) is a 4-year program that was launched in 2014/15, with the first students graduating in 2018. It is a hands-on, laboratory-focused, applied physics and technology program that is designed to prepare students for careers in the technology sector. The curriculum review, self-study, and external review that our program has undergone have all been great opportunities for examining the PMT program in-depth. They have revealed areas where the program is doing well (for example, instructional delivery and student success), areas that are generally doing well but with identified avenues for positive change (for example, curriculum), and areas where improvement is clearly needed (for example, student recruitment and retention).

Strengths

Overall, as the External Review Team (ERT) noted, “the design and delivery of program are meeting students’ needs and meeting the primary objective of training students to work in the tech sector.”

Regarding curriculum, the ERT noted that the program contains a good mix of fundamental physics, hands-on technical skills, and specialized applications. In addition, the curriculum mapping process showed that our PLOs are appropriate and well covered by the curriculum. Having said that, various aspects of the curriculum have been earmarked for improvement.

The qualifications, expertise, engagement, and currency of program faculty were identified as major strengths, and they ensure we can provide students with a great experience and a high-quality education. One of our common modes of instruction, with combined labs and lectures (sometimes referred to as “studio” format), was identified by the ERT as an important strength, as it promotes engagement and active learning.



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Project-based learning and experiential learning are also major program assets. In addition to mini-projects in many of our courses, students do extended third- and fourth-year projects, often on real world applications of program content. The ERT commended our ability to work one-on-one with students when supervising projects. They also noted that we are well-stocked with laboratory equipment, from standard teaching equipment to specialized research-grade equipment that our students are fortunate to have access to. The innovative CloudLab, which allows students (from KPU and other institutions) to perform labs remotely is a great asset to our department. In addition to widening access to physics laboratory education, it is an excellent promotional resource.

Another important component of experiential learning in the program is work experience, which helps prepare students for the workforce after they graduate, and in many cases leads directly to post-graduation employment in the tech sector. The program review process has shown that there is a high demand for our graduates, as their success in finding employment in the tech sector and/or in pursuing graduate studies is very high. Alumni also commented on how well the program has prepared them for their chosen career paths. The ERT commended the quality of our connections with the local technology sector, which are an important part of helping students securing work experience opportunities, as well as helping to ensure the program remains current and relevant.

Although the above are strengths of the program, opportunities for improvement have been identified in several of those (and other) areas.

Challenges and Opportunities for Improvement

Our greatest challenge is recruitment of students. There is a need to boost promotion of the program in order to increase student numbers. We identify various ways that we can tackle this, by ourselves and in conjunction with the Dean's Office, Advisors, FSO, Marketing, and KPU International. With our growing number of successful graduates, examples of alumni and student success can be used to help promote the program.

Retention of students is also a challenge, both for our program and the Faculty of Science and Horticulture as a whole. There is great opportunity to increase student numbers in our 2nd, 3rd, and 4th year courses through retention of more first-year students.

An issue closely related to recruitment and retention is that of space, particularly for student projects (we recently lost access to temporary student project space). As noted in the Self-Study Report (SSR): *“Surveys, which were carried out before the loss of the space, indicate a high level of student satisfaction with lab space, project space, and fabrication/workshop facilities. In order to maintain student satisfaction with the program’s facilities as well as the high quality of their hands-on education, replacement fabrication and project space will be*

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required. This will also be needed to accommodate the planned increased number of students.” Similar sentiments were expressed by the ERT: “Dedicated project space should be found for PMT students. The ERT recognizes that such space must be supported by higher enrollments in the Program; however, the program will have challenges growing from its current size without this space.”

Improvements to various aspects of the curriculum need to be investigated, including for example: the potential addition of a dedicated computer programming course as well as more formal scaffolding of programming throughout the other courses in the program, constraining choices of business courses in the program so that students take courses that are more useful and relevant, and the possible widening the work experience component of the program (which could involve expansion to a co-op program). We will also investigate how the structure and content of our first-year labs can be improved in order to bring them into line with current research-informed best practices.

Both the SSR and the ERT recommend the enhancement and expansion of our connections with local industry. This will be addressed in a variety of ways, including renewing links and increasing engagement with local industry associations, organizing and participating in more events that involve the local tech sector (and developing an annual calendar of such events), and identifying and addressing gaps in the membership of the Program Advisory Committee. This will ensure our curriculum remains current and relevant and that our graduates will continue to have good career prospects. Since not all students want to enter the workforce directly after graduation, we recognize that we can also provide more advice and support for those who wish to pursue graduate school.

We are committed to doing more to educate ourselves on the topic of Indigenization and how it relates our program. We have also identified diversity, particularly in relation to gender diversity and international students, as an area in which we can improve.

We have also identified the need to investigate how we and our students can better benefit from KPU services such as the Library, Advising, and support services for international students.

Note on nomenclature for codes preceding the recommendations:

ERR stands for External Review Report. Those labelled ERR-C are their Curriculum recommendations, ERR-D are their Program Demand recommendations, ERR-I are their Instructional Delivery recommendations, and ERR-FS are their Facilities and Services recommendations. Numbering: ERR-D2 is the ERT’s second Program Demand recommendation, ERR-FS3 is their third Facilities and Services recommendation etc.

SSR stands for Self-Study Report. Numbering: SSR5.3 is the third recommendation from chapter 5 of the SSR etc. (The numbering follows the order in which the recommendations are listed in the summary in chapter 6 of the SSR.)

RECOMMENDATIONS THE QUALITY ASSURANCE PLAN DOES NOT ADDRESS

The Recommendations from the Self-Study Report and External Review Report that this Plan does not address as provided below, with a brief rationale for why these Recommendations cannot be addressed.

Recommendations	Indicate Self-Study Report (SSR) or External Review Report (ERR) and page number	Rationale for Not Addressing
<i>SSR2.2 Assess whether or not the biology content of the program needs to be changed. Although there have been good reasons for including biology in the program (such as ensuring alignment with KPU’s BSc Framework, providing breadth of education, and preparing students for potential careers in the biotechnology sector), the survey results suggest that the biology requirement and its relevance to the program should be reviewed.</i>	SSR page 23	The External Review Team recommended that we keep the biology content of the program, as it provides important breadth of education and is important for graduates who pursue careers in the biotechnology sector.
<i>SSR2.1 Update the PHYS 2420 and PHYS 4900 course outlines to better align them with current practice.</i>	SSR page 21	We don’t plan to pursue revision of PHYS 4900. After reviewing topics that have been taught and that could be taught, no change is necessary. Most topics will be technical. The communications version of the course was nontypical and that’s what made the mapping difficult. However we will review and update PHYS 2420 – see action item under Goal 4.

QUALITY ASSURANCE FIVE-YEAR ACTION PLAN

The Quality Assurance **Goals** for improving or maintaining program quality over the next five years are:

MONTH/YEAR WHEN THE FIVE-YEAR ACTION PLAN BEGINS: May 2023

GOAL 1: Grow enrollment in the PMT program and increase retention.

Recommendation(s) this Goal Addresses	Indicate Report & Page Number
<i>ERR-D1. The ERT encourages KPU to provide the PMT program with dedicated recruiting and outreach support that understands the program, target audience, and careers. Existing university resources and connections with prospective student populations can be leveraged to increase program visibility, but these resources must be coupled with deep knowledge of the outcomes of the Program and career opportunities for Program graduates. The ERT considers this one of the most important recommendations in this Review.</i>	ERR page 7
<i>ERR-D2 Use KPU resources to create promotional materials for the PMT program. Focus on careers to educate students and parents on the careers that can be pursued with an applied physics degree. Students and alumni that the ERT met were enthusiastic and articulate about the PMT program and their careers: feature these students and alumni in these materials as inviting case studies.</i>	ERR page 7
<i>SSR4.2 Incorporate more examples of student success into the promotion of the program.</i>	SSR page 43
<i>ERR-D3 Many students take introductory Physics courses at KPU intending to, e.g., obtain Engineering certificates and transfer to a different school. The PMT program shares many features with Engineering programs but offers significant flexibility on careers and training. Consider ways to attract/retain students from these paths.</i>	ERR page 7
<i>SSR3.12 Develop a coordinated action plan for promoting our program to students in our first-year classes.</i>	SSR page 37
<i>ERR-I2 We encourage KPU to continue supporting the high visibility CloudLab program with dedicated infrastructure to continue offering it. We also recommend a stronger Physics Department branding of the CloudLab infrastructure to leverage it in recruiting efforts. The ERT team recommends that the PMT program continue to work with KPU to encourage the dedicated space allotment needed for the program for not only visibility but viability and growth.</i>	ERR page 8

Recommendation(s) this Goal Addresses	Indicate Report & Page Number
<i>SSR3.3 Develop an annual calendar of events. This would include both internal and external events of the kind described above. It would help to keep us accountable and would help ensure that events stay 'on our radar' from year to year.</i>	SSR page 26
<i>SSR3.14 Develop an annual calendar of events (similar to what was recommended above for our interactions with industry).</i>	SSR page 37
<i>SSR3.13 Engage more with high school students through school visits, involvement in science fairs, and events hosted by us on campus. Seek the support of our Dean's office (e.g. our Faculty's Communications and Events Specialist) and the Future Students Office in these endeavours.</i>	SSR page 37
<i>SSR3.15 Expand our presence on social media, particularly with a view to targeting potential students.</i>	SSR page 37
<i>SSR3.16 Renew promotional activities at local colleges that do not have physics degrees, and whose students may be seeking opportunities in physics beyond the first- or second-year level.</i>	SSR page 37
<i>SSR3.10 To help achieve this goal of reaching the FSH average of 35% international students, we should learn more about how KPU recruits international students and find out if it is possible for KPU's international recruiters and agents to promote our program more abroad.</i>	SSR page 35
<i>SSR3.11 Since the low retention rate is a Faculty-wide issue, we recommend that Chairs and Faculty Council discuss this and initiate a Faculty-wide response.</i>	SSR page 35
<i>SSR5.3 Faculty should clarify expectations around advising and communicate with advisors about how the service can better meet the needs of the program.</i>	SSR page 47
<i>SSR3.9 We recommend that faculty undertake an investigation into the issue of gender diversity in the department as a whole (students, faculty, and staff) to try to identify strategies for redressing the imbalance.</i>	SSR page 35

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Actions(s) Required to Achieve this Goal	Led By	Start on (M/YY)	Complete By (M/YY)	Notes
<i>Identify specific internal and external promotional events that are important for PMT to be represented at, and ensure they are included in the FSH calendar of events.</i>	Chair	September 2023	December 2023	Ensure regular attendance by PMT representatives at these events to promote the program.
<i>Propose a two-year physics/engineering credential which will ladder into the PMT program. The first step is to develop a proposal.</i>	Engineering program co-ordinator	August 2023	September 2024	This would start with seeking pre-approval from the Provost's office, followed by writing the program proposal.
<i>Seek approval for the above proposal at the relevant FSH and Senate committees</i>	Engineering program co-ordinator	June 2024	June 2025	The goal is to start offering the program in Fall 2025. This diploma would use existing courses and is unlikely to require additional resources or faculty FTE.
<i>In conjunction with the Dean's office, FSO, and Marketing, develop promotional materials for the program strongly featuring stories of graduates. These will be used internally and externally and will showcase both the diversity of our student body and of the opportunities opened by the program.</i>	Chair and L Flinn	May 2023	October 2023	We have arranged for Marketing to come to our labs to take photos and record interviews with alumni and students. We are also working with our Dean's office and Marketing on developing a poster and renewing our website. We are also arranging for photos of current students and alumni in their workplace.
<i>Have a designated faculty member on each campus to visit all our first-year physics classes to introduce KPU students to the program. Also invite students to PMT welcome events and student project presentations.</i>	Chair	September 2023	September 2024	Each year, co-ordinated by the chair, someone will be designated to perform this task.
<i>Have a repository of demonstrations and activities for outreach.</i>	M Coombes, L Flinn, D Mathewson	August 2023	December 2023	Although we already have many demonstrations for promotional purposes, we want to formalise their organisation so that they are easily accessed for events.

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Actions(s) Required to Achieve this Goal	Led By	Start on (M/YY)	Complete By (M/YY)	Notes
<p><i>Work with Marketing to develop materials to use the CloudLab to promote the program.</i></p> <p><i>Host a summit between key faculty and staff in Physics, as well as representatives from Advising, Marketing and FSO to co-develop these materials and a marketing strategy</i></p>	T Sato	January 2024	May 2024	New space for the CloudLab has already been approved and budgeted.
<p><i>Meet annually with FSO, FSH advisors, international advisors, and Marketing to maintain a dialogue on how best to promote the program to different groups. Offer tours and produce explainers for these groups to ensure they are fully up to speed on the program.</i></p>	Chair and L Flinn	August 2023	August 2024	First round of meetings in first year, with annual repetition.
<p><i>Maintain communication with students interested and admitted to the PMT program by sending a welcome letter and invitation to welcome events.</i></p>	Chair	September 2023	October 2024.	<p>This will require coordination with the Dean's Office for access to student contact info.</p> <p>We will plan an entertaining welcome social event for the first month of the Fall semester.</p>
<p><i>Establish and renew MOU's with other post-secondary institutions not offering full Physics degree programs to ease transfer of students to PMT at KPU.</i></p>	Physics articulation rep	September 2023	May 2024	Provincial articulation meeting is typically held in May of each year.
<p><i>Establish internal MOU with KPU Mechatronics program for laddering their students into PMT</i></p>	Chair	May 2023	December 2024	A draft proposal has been written. Next steps will involve discussion at the level of the Deans.
<p><i>Work with FSH Dean's office and other departments on the creation of an FSH recruitment and retention committee led by chairs and coordinators.</i></p>	M Coombes	June 2023	September 2023	This has been discussed at Faculty Council and at chairs/co-ordinators committee, and will be brought up at upcoming meetings.
<p><i>Work with FSO to develop a recurring outreach event aimed specifically at grade 9-10 women.</i></p>	Chair	January 2024	December 2026	

Resource Requirements (if applicable)
Resources required to achieve this Goal: Seek a one-course time release for development of physics/engineering diploma.
When resources will be required: Spring 2024 for time release.
Faculty and/or Institutional support required: As mentioned above, support from Marketing, advisors, and the Dean’s Office will be required for many of the action items listed above.

GOAL 2: Enhance and expand connections with organizations external to KPU

Recommendation(s) this Goal Addresses	Indicate Report & Page Number
<i>SSR3.1 Renew links with local professional associations such as the BC Tech Association and the BC section of the ISA. This will allow faculty and students to engage in the networking events that are organized by these associations, which will in turn raise the profile of the program and lead to more opportunities (for student work experience, for collaborative projects, and for jobs post-graduation).</i>	SSR page 26
<i>SSR3.2 Organize more events, both on- and off-campus. Including field trips, invited talks, and alumni/student competitions. We also recommend a student-industry networking evening on campus, which was held once several years ago and which could potentially become an annual event.</i>	SSR page 26
<i>SSR3.4 Develop a LinkedIn profile for the program to allow us to engage more with industry online.</i>	SSR page 26
<i>SSR3.9 We recommend that faculty undertake an investigation into the issue of gender diversity in the department as a whole (students, faculty, and staff) to try to identify strategies for redressing the imbalance.</i>	SSR page 35
<i>SSR3.16 Renew promotional activities at local colleges that do not have physics degrees, and whose students may be seeking opportunities in physics beyond the first- or second-year level.</i>	SSR page 37
<i>ERR-C5 Incorporate technology being developed in the greater Vancouver area into the curriculum via course material, laboratory projects, industrial seminars, and tours. The program should continue to leverage and expand the scope of these industry connections to market itself internally and externally.</i>	ERR page 5

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Recommendation(s) this Goal Addresses	Indicate Report & Page Number
<i>ERR-FS2 Continue to seek industrial partnerships and for KPU to continue to support the acquisition, installation, and operation of high-tech equipment. The engagement with the current PAC is well established, but further membership may be a place to explore for options of industry-based projects, support, student mentorship for capstone, and sponsorships for awards and competition entries for students and projects.</i>	ERR page 10
<i>ERR-FS4 Work to formalize agreements with institutions in conjunction with KPU leadership and FSH advising services to provide a concrete framework for students pursuing graduate studies. Continue to work with advising services and KPU leadership to streamline some of these pathways so that there is more support for students and faculty.</i>	ERR page 10

Action(s) Required to Achieve this Goal	Led by	Start on (M/YY)	Complete By (M/YY)	Notes
<i>Invite the BC Tech Association to come to speak to other FSH departments to encourage faculty-wide involvement</i>	F Callaghan	August 2023	December 2023	This will help strengthen our links with the BC Tech Association and ensure our Faculty gets maximum benefit from the FSH's membership.
<i>Set up and maintain LinkedIn profile for PMT</i>	K Tahani	June 2023	September 2023	
<i>Establish connections with SCWIST (Society for Canadian Women in Science and Technology) and CAP's (Canadian Association of Physicists) Division for Gender Equity in Physics and encourage dept members to join these organisations.</i>	Chair	September 2023	September 2023	This could result in, for example, representatives from SCWIST coming to KPU for an annual event.
<i>Initiate a seminar series with guest speakers from industry or applied research labs, with a goal of having at least one speaker per semester (Fall and Spring)</i>	F Callaghan	January 2024	May 2025	These would be open to students, faculty, and staff from across KPU.
<i>Invite representatives of suitable graduate programs to present to our students to increase their awareness of their options for further study.</i>	Chair	September 2023	May 2024	Although graduate studies is not the driving direction of our programming, in addition to raising awareness among our students, establishing good relations with those institutions raises the profile of our program overall.

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Action(s) Required to Achieve this Goal	Led by	Start on (M/YY)	Complete By (M/YY)	Notes
<i>Establish a regular industry network event, possibly in conjunction with other departments.</i>	F Callaghan	January 2024	January 2026	A successful industry-student event was held in 2017. This would translate that into a recurring event.
<i>Commit to filling at least 3 seats on the PAC with women and/or Indigenous representatives from relevant industry sectors.</i>	F Callaghan	May 2024	May 2025	This will be done by reaching out to specifically to women and indigenous-led companies.
<i>Identify gaps in PAC membership to ensure all relevant industry sectors are represented.</i>	F Callaghan	May 2024	May 2025	This will be done in discussion with existing PAC members.
<i>Showcase industrial partner contributions to the program and how they have benefited our students in order to encourage further support.</i>	Chair	May 2023	May 2025	This will include developing promotional materials and acknowledging industry support at promotional events and on our website. For example, this May we are demonstrating the scanning electron microscope donated by Ballard Power Systems.
<i>Increase the number of visits / field trips to local companies to give students more exposure to the local tech sector, with a goal of having one trip per semester (Fall and Spring)</i>	D Mathewson	September 2023	September 2025	This activity will continue indefinitely.

Resource Requirements (if applicable)
Resources required to achieve this Goal: Request time release for the industry-related action items as they will require a large time commitment.
When resources will be required: Fall 2024.
Faculty and/or Institutional support required: Click here to enter text.

GOAL 3: Enhance student experience

Recommendation(s) this Goal Addresses	Indicate Report & Page Number
<i>SSR2.5 Investigate the suitability of the new topics that were identified by survey respondents for inclusion in the program.</i>	<i>SSR page 23</i>
<i>SSR3.1 Renew links with local professional associations such as the BC Tech Association and the BC section of the ISA.</i>	<i>SSR page 26</i>
<i>SSR3.2 Organize more events, both on- and off-campus. Including field trips, invited talks, and alumni/student competitions. We also recommend a student-industry networking evening on campus, which was held once several years ago and which could potentially become an annual event.</i>	<i>SSR page 26</i>
<i>SSR3.8 Research is crucial to the success of students in the PMT program. The Physics Department should continue to have representation on Faculty and Senate committees considering the future of scholarly activity at KPU.</i>	<i>SSR page 30</i>
<i>SSR5.4 As part of the effort to increase enrollments, and in anticipation of an associated increase in international enrollments, faculty should familiarize ourselves with the services that KPU provides for international students.</i>	<i>SSR page 48</i>
<i>SSR4.1 Investigate ePortfolios as a program-wide self-assessment and a means for students to reflect on their progress.</i>	<i>SSR page 41</i>
<i>SSR5.1 Work with and seek the support of the relevant authorities at KPU to ensure the program has sufficient space to maintain quality and accommodate the planned increase in student numbers.</i>	<i>SSR page 46</i>
<i>ERR-D4 Seek opportunities to leverage the experiential learning of the students to participate in high-profile postsecondary student competitions to raise the external profile of the Program.</i>	<i>ERR page 7</i>
<i>ERR-FS1 Dedicated project space should be found for PMT students. The ERT recognizes that such space must be supported by higher enrollments in the Program; however, the program will have challenges growing from its current size without this space. The ERT team also recognizes that there are other small specialized programs at KPU that have dedicated project space, labs, and equipment. This has given these programs not only visibility, but room for growth both in enrollment and the program. The ERT recommends that the PMT look and some of the best practices/strategies that other programs have used.</i>	<i>ERR page 10</i>
<i>SSR3.5 Discuss and develop a clear understanding of what indigenization means for our program. Seek guidance from KPU's Indigenous Advisory Committee.</i>	<i>SSR page 27</i>
<i>SSR3.9 We recommend that faculty undertake an investigation into the issue of gender diversity in the department as a whole (students, faculty, and staff) to try to identify strategies for redressing the imbalance.</i>	<i>SSR page 35</i>

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Action(s) Required to Achieve this Goal	Led by	Start on (M/YY)	Complete By (M/YY)	Notes
<i>Maintain physics membership of the FSH Research Committee to ensure we continue to be involved in FSH efforts to expand student involvement in research.</i>	J Hoyland	May 2023	May 2023	Membership will be ongoing.
<i>Widen participation in the annual student research seminar to include presentations by students from more of our courses</i>	J Hoyland	September 2023	December 2024	
<i>Investigate possibility of expanding the above seminar to an FSH-wide event (and other STEM-based programs in other Faculties) and inviting more widely in the University and beyond.</i>	Chair	January 2024	December 2025	Support from Dean's Office will be required for co-ordination of FSH-wide involvement and space.
<i>Strike an ad-hoc committee including a female student representative and an alumna to investigate the issue of gender diversity within the department.</i>	J deBenedictis	September 2023	September 2025	This committee shall produce a report suggesting concrete, ethical, and legal ways to create more gender parity both within our department and within our PMT program student body
<i>Invite students to regular industry/student network event.</i>	F Callaghan	January 2024	January 2026	This is the event that will be established as per action item under Goal 2.
<i>Seek guidance from the Indigenous Advisory Committee and Indigenous Students' Association on how indigenization can be addressed in our program.</i>	Chair	January 2024	February 2024	Currently we contribute to the annual Open Doors Open Minds event.
<i>Invite someone from the International office to a dept meeting to talk to us about the services provided by KPU for international students.</i>	Chair	August 2023	August 2023	
<i>Investigate the use of e-portfolios and present results of investigation to dept.</i>	D Mathewson	September 2023	August 2024	e-portfolios may be an effective way of assessing the development of student skills as they work on a variety of projects throughout the program and would build into a body of work which would help students sell themselves to employers after graduation.
<i>Investigate possible external student competition opportunities.</i>	L Flinn	September 2023	September 2024	

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Action(s) Required to Achieve this Goal	Led by	Start on (M/YY)	Complete By (M/YY)	Notes
<i>Develop a proposal for dedicated student research project space in conjunction with other FSH departments and bring forward to Faculty Council for support.</i>	Chair	September 2023	September 2025	

Resource Requirements (if applicable)
Resources required to achieve this Goal: <i>Click here to enter text.</i>
When resources will be required: January 2024 to December 2025 for initial iteration and ongoing thereafter.
Faculty and/or Institutional support required: Dean’s Office support for organization of FSH-wide seminar.

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GOAL 4: Implement curricular changes as described in the External Review Report, to better align the program with the needs of stakeholders

Recommendation(s) this Goal Addresses	Indicate Report & Page Number
<i>ERR-C1 Constrain the choice of Business courses to areas identified by the PAC as being key – give students fluency in Business language and processes, an overview of how companies are structured and work, and an understanding of issues involved in making business decisions about the viability of products and services, and overall project management skills. Incorporate business skills into Physics project courses through a focus on project management to gain experience in planning around design-of-experiment, de-risking, strategic planning, etc.</i>	ERR page 5
<i>ERR-C2 Investigate if a formal programming course can be added to the curriculum.</i>	ERR page 5
<i>ERR-C3 Include the use of computing throughout the PMT curriculum and a top-down scaffolded approach to skills, with a focus on modern scientific languages such as Python.</i>	ERR page 5
<i>ERR-C4 Investigate whether additional flexibility in the PMT program to allow multiple work terms, possibly in successive summer terms, or even to include longer terms within a year.</i>	ERR page 5
<i>ERR-C5 Incorporate technology being developed in the greater Vancouver area into the curriculum via course material, laboratory projects, industrial seminars, and tours. The program should continue to leverage and expand the scope of these industry connections to market itself internally and externally.</i>	ERR page 5
<i>ERR-I1 The Physics Department should examine the administrative structure of its introductory courses, particularly the lab courses, and streamline them where possible. Consult recent literature on the purpose and use of introductory physics labs when considering their lab courses.</i>	ERR page 8
<i>ERR-FS3 The program should explore whether additional software resources are required to ensure that PLOs are being met and that software used in teaching and projects is relevant within industry.</i>	ERR page 10
<i>SSR2.1 Update the PHYS 2420 and PHYS 4900 course outlines to better align them with current practice.</i>	SSR page 21

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Recommendation(s) this Goal Addresses	Indicate Report & Page Number
<i>SSR2.3 Investigate ways in which the computing content of the program can be strengthened.</i>	SSR page 23
<i>SSR2.4 Review the content and structure of the mathematics component of the program.</i>	SSR page 23
<i>SSR2.5 Investigate the suitability of the new topics that were identified by survey respondents for inclusion in the program.</i>	SSR page 23
<i>SSR5.2 As a department, we should discuss and identify library resources that we might want to use. This could involve a more detailed survey of faculty to find out how library resources are currently used in our 2nd, 3rd, and 4th year courses. This will help us determine if we could be making better use of library resources.</i>	SSR page 44

Action(s) Required to Achieve this Goal	Led by	Start on (M/YY)	Complete By (M/YY)	Notes
<i>Re-open discussions with co-op office with regards to support which could be offered to expand work experience opportunities for students.</i>	Chair and F Callaghan	January 2024	September 2024	
<i>Update the PHYS 2420 course outline to reflect current practice</i>	F Callaghan and K Tahani	May 2024	June 2024	Note that the recommendation that this action arises from (SSR2.1) also mentions PHYS 4900, which we have decided not to update. See rationale on page 3.
<i>Survey faculty to determine how computing and software are currently used, taught, and incorporated in the program and assess the results for gaps.</i>	K Tahani	September 2023	September 2024	
<i>Use the survey results to develop a framework for including computing throughout the program to ensure students gain experience with key programming topics and techniques. Update course outlines accordingly.</i>	K Tahani	September 2024	September 2026	This could include developing a new course and/or incorporating elements of computing throughout the program.
<i>Pilot suggested additional topics within our Special Topics course.</i>	Chair	March 2024	March 2025	This is something we do every time this course is taught. This course will next run in Spring 2025.

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Action(s) Required to Achieve this Goal	Led by	Start on (M/YY)	Complete By (M/YY)	Notes
<i>Survey faculty to find out which journals we would like easy access to, and follow up with the library.</i>	T Sato	October 2023	January 2024	
<i>Formalize the incorporation of literature research skills in the program. Update course outlines accordingly.</i>	F Ruiz Oliveras	September 2023	September 2025	This would include identification of reliable sources in the technical, popular and academic literature.
<i>Reassess math topics that are required for the program</i>	T Sato	September 2023	April 2024	Survey PMT faculty to find out which math topics students need knowledge of to successfully complete our courses
<i>Consult with math dept on the content of MATH 2721 and 2821 to ensure required topics are covered.</i>	T Sato	May 2024	September 2024	
<i>Investigate including more examples of technology developed in the region into the curriculum.</i>	F Callaghan	September 2023	September 2026	This would be bundled with the other industry-related action items for which time release will be requested.
<i>Form a committee that includes lab staff to review literature on best practices for first-year laboratory education.</i>	J Hoyland	September 2023	August 2024	This could involve liaising with the Teaching and Learning Commons.
<i>Incorporate the findings of the above review into our courses.</i>	J Hoyland	September 2024	September 2026	
<i>Consult with PAC to determine which Business topics to include in the program. Then consult School of Business to determine which of their courses would be appropriate.</i>	Chair	September 2023	December 2024	We will aim to discuss this at the next PAC meeting.

Resource Requirements (if applicable)
Resources required to achieve this Goal: <i>Click here to enter text.</i>
When resources will be required: <i>Click here to enter text.</i>
Faculty and/or Institutional support required: Assistance from the co-op office, the math department, and the School of Business.

Physics for Modern Technology Quality Assurance Plan

GOAL 5: Build the resilience of the program to future changes

Recommendation(s) this Goal Addresses	Indicate Report & Page Number
<i>ERR-FS1 Dedicated project space should be found for PMT students. The ERT recognizes that such space must be supported by higher enrollments in the Program; however, the program will have challenges growing from its current size without this space. The ERT team also recognizes that there are other small specialized programs at KPU that have dedicated project space, labs, and equipment. This has given these programs not only visibility, but room for growth both in enrollment and the program. The ERT recommends that the PMT look and some of the best practices/strategies that other programs have used.</i>	ERR page 10
<i>ERR-I2 Continue supporting the high visibility CloudLab program with dedicated infrastructure to continue offering it. We also recommend a stronger Physics Department branding of the CloudLab infrastructure to leverage it in recruiting efforts. The ERT team recommends that the PMT program continue to work with KPU to encourage the dedicated space allotment needed for the program for not only visibility but viability and growth.</i>	ERR page 8
<i>SSR3.6 Prior to a new hire, the department should have a discussion on gaps any retirements will create. In addition, the department should have regular discussions with the Program Advisory Committee about topics in physics that are growing in importance to Industry and conversely topics that are declining. These discussions should drive hiring criteria.</i>	SSR page 30
<i>SSR3.7 Alternate instructors for second-, third-, and fourth-year courses should be designated. Current instructors should be asked to develop a package of teaching materials such as a detailed course outline, teaching notes, sample examinations, sample projects, and the like. Course instructors and their alternates should meet to discuss the course and the materials. If possible, hiring lists for the courses should be kept for hiring on short notice.</i>	SSR page 30
<i>SSR5.1 Work with and seek the support of the relevant authorities at KPU to ensure the program has sufficient space to maintain quality and accommodate the planned increase in student numbers.</i>	SSR page 46

Action(s) Required to Achieve this Goal	Led by	Start on (M/YY)	Complete By (M/YY)	Notes
<i>Develop a proposal for dedicated student research project space in conjunction with other FSH departments and bring forward to Faculty Council for support.</i>	Chair	September 2023	September 2025	
<i>Work with Facilities to realize the CloudLab's new permanent home on the Richmond campus and continue development work to expand online lab offerings.</i>	T Sato	May 2023	September 2025	Development of CloudLab will be an ongoing process.
<i>Develop documentation and standard operating procedures for all laboratory equipment (for example CloudLab, scanning electron microscope and other specialized equipment) to ensure resilience in case of personnel changes.</i>	Chair	September 2023	September 2026	

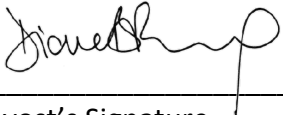



Physics for Modern Technology Quality Assurance Plan

Action(s) Required to Achieve this Goal	Led by	Start on (M/YY)	Complete By (M/YY)	Notes
<i>Maintain a list of who in dept can teach which courses and perform a SWOT (strengths, weaknesses, opportunities and threats) analysis to ensure high program quality.</i>	Chair & Dept search committee	May 2023	May 2024	
<i>Maintain discussions with PAC to ensure program currency and relevance to industry needs.</i>	F Callaghan	January 2024	January 2025	
<i>Maintain a repository of teaching materials that instructors can use when teaching a course for the first time or when they have to take over at short notice.</i>	J deBenedictis & M Coombes	May 2023	May 2025	

Resource Requirements (if applicable)
Resources required to achieve this Goal: Time release for development of new CloudLab labs.
When resources will be required: 2024
Faculty and/or Institutional support required: Work with Facilities to develop CloudLab space.

PLAN SUPPORTED BY:

<p>Diane Purvey</p> <hr style="border: 0; border-top: 1px solid black; margin-top: 5px;"/> <p>_ Provost's Name</p>	 <hr style="border: 0; border-top: 1px solid black; margin-top: 5px;"/> <p>Provost's Signature</p>	<p>Oct 13, 2023</p> <hr style="border: 0; border-top: 1px solid black; margin-top: 5px;"/> <p>Date</p>
<p>Brett Favaro</p> <hr style="border: 0; border-top: 1px solid black; margin-top: 5px;"/> <p>Dean's Name</p>	 <hr style="border: 0; border-top: 1px solid black; margin-top: 5px;"/> <p>Dean's Signature</p>	<p>Oct 11, 2023</p> <hr style="border: 0; border-top: 1px solid black; margin-top: 5px;"/> <p>Date</p>